Chapter Six

Improving Commercial and Institutional Recovery Levels

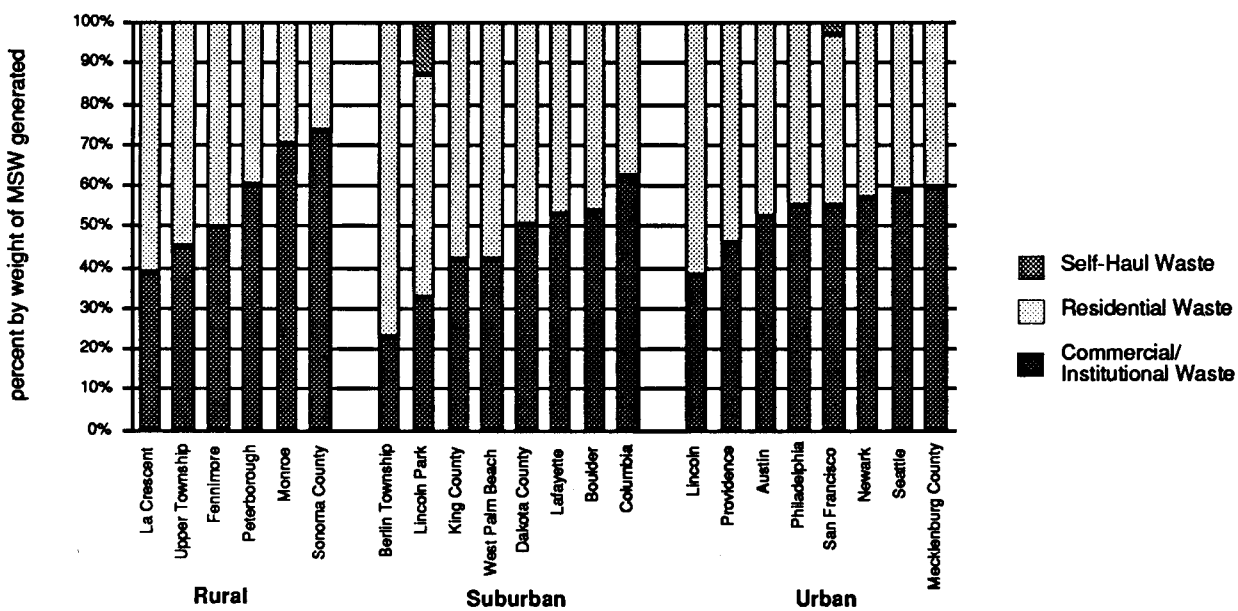
Overview

Commercial and institutional waste is often a significant portion of municipal waste, even in small cities and suburbs.[1] (See Chart 6.1.) For our sample, commercial waste generated ranged from 23 percent of municipal solid waste (MSW) in the suburban community of Berlin Township, New Jersey to over 50 percent of MSW in cities such as Philadelphia, San Francisco, and Seattle. Unlike most residential waste, however, commercial material is usually collected by the private sector, and municipalities have been slower to target this waste stream for recovery. Many communities now realize that commercial and institutional recycling and composting efforts play an important role in meeting high waste recovery goals.

Table 6.1 lists figures for commercial and institutional waste generated and recovered in the

Chart 6.1

The Contribution of Commercial and Institutional Waste to MSW Generated



Notes: Residential and commercial breakdowns in the cities of Wapakoneta, West Linn, Bowdoinham, Berkeley, and Portland were not available. Total recovery rates were used in Austin, Columbia, Newark and Upper Township as C&D waste is not tracked separately from MSW. Commercial waste in Newark and Upper Township is privately collected material and residential waste is publicly collected material. Naperville, Perkasie, and Takoma Park are excluded as commercial waste generation data were not available. Self-haul waste includes materials generated by the residential and commercial sectors; a breakdown between these sectors is not available in these cities.

Table 6.1
Commercial and Institutional Waste Generated and Recovered

Community	Year Data Collected	Com/Inst Waste Generated (Tons)	Com/Inst Materials Recycled (Tons)	Com/Inst Materials Composted (Tons)	Com/Inst Materials Recovered (Tons)	% Com/Inst Materials Recycled (By Wt.)	% Com/Inst Materials Composted (By Wt.)	% Com/Inst Materials Recovered (By Wt.)
Austin, TX	FY89	NA	13,312	0	13,312	NA	NA	NA
Berkeley, CA	FY91	NA	NA	NA	NA	NA	NA	NA
Berlin Township, NJ	1990	1,853	1,124	0	1,124	61	0	61
Boulder, CO	1990	33,605	4,137	25	4,162	12	0	12
Bowdoinham, ME	FY90	NA	NA	NA	NA	NA	NA	NA
Columbia, MO	FY90	51,971	6,671	NA	6,671	13	NA	13
Dakota County, MN	1990	114,010	27,748	0	27,748	24	0	24
Fennimore, WI	1990	631	158	0	158	25	0	25
King County, WA	1990	541,116	159,439	34,528	193,967	29	6	36
La Crescent, MN	1990	683	59	0	59	9	0	9
Lafayette, LA	FY90	39,005	3,125	0	3,125	8	0	8
Lincoln, NE	1990	82,989	21,027	0	21,027	25	0	25
Lincoln Park, NJ	1990	4,608	3,193	20	3,213	69	0	70
Mecklenburg Co., NC	1990	425,678	92,520	0	92,520	22	NA	22
Monroe, WI	1989	8,858	2,359	0	2,359	27	0	27
Naperville, IL	1990	NA	NA	NA	NA	NA	NA	NA
Newark, NJ (a)	1989	195,556	87,350	2,172	89,522	45	1	46
Perkasie, PA	1990	NA	NA	NA	NA	NA	NA	NA
Peterborough, NH	1990	2,998	120	0	120	4	0	4
Philadelphia, PA (a)	FY90	1,132,079	181,959	0	181,959	16	0	16
Portland, OR	1990	NA	NA	NA	NA	NA	NA	NA
Providence, RI	1990	67,000	NA	NA	8,700	NA	NA	13
San Francisco, CA	1990	392,764	68,971	1,858	70,829	18	0	18
Seattle, WA	1990	397,315	154,199	3,444	157,643	39	1	40
Sonoma County, CA	1990	340,297	32,319	1,570	33,889	9	0	10
Takoma Park, MD	1990	NA	4	0	4	NA	NA	NA
Upper Township, NJ (a)(b)	1990	5,733	547	1,409	1,957	10	25	34
Wapakoneta, OH	9/89-8/90	NA	NA	0	NA	NA	NA	NA
West Linn, OR	1990	NA	340	78	417	NA	NA	NA (c)
West Palm Beach, FL	4/90-3/91	51,004	174	0	174	0	0	0

Key:

Com = Commercial Inst = Institutional NA = Not Available Wt. = weight

Notes:

In larger cities such as Philadelphia and Providence some private sector recycling activities were not tracked during the base year and thus listed data may not reflect all private sector recovery activities. See Appendix C for a detailed explanation of what may or may not be included in above commercial/institutional figures, and, if applicable, how tonnage figures were calculated. Yard waste composted by landscapers and any beverage containers recovered under bottle bills are excluded as this tonnage cannot be broken into residential and commercial/institutional. Self-hauled materials are similarly excluded.

(a) Figures represent tonnage handled by private sector, which may include some residential waste.

(b) The commercial/institutional recovery activities undertaken by the public sector are not reflected in these figures.

(c) Figures for commercial/institutional waste disposed are not available, thus a commercial/institutional recovery rate cannot be calculated. According to estimates of waste disposed provided by the City's Recycling Coordinator, West Linn recovered approximately 45% of its commercial waste.

Table 6.2
Commercial/Institutional Recovery Activities

Community	Total Businesses/ Institutions	Businesses/ Institutions Served w/CS (a)	Institutions/ Businesses Privately Served	Mandatory (b)	Materials Mandated for Separation	Economic Incentives to Haulers (c)	Economic Incentives to Bus/Instit. (d)	Technical Assistance to Businesses (e)	Number of Private Haulers
Austin, TX	NA	0	350	No	None	None	None	None	2
Berkeley, CA	3,318	250	NA	No	None	None	RC	None	NA
Berlin Township, NJ	280	200	80	Yes	ONP,OCC,A,F,S,G,P (l)	None	NF,RC	None	NA
Boulder, CO	6,000	0	150 (g)	No	None	None	None	None (h)	3
Bowdoinham, ME	15	0 (i)	4	No	None	None	NF,RC	None	2
Columbia, MO	3,032	0	300	No	None	None	RF,RC	None	1
Dakota County, MN	44,227	0	NA	No	None	RS	NA	None	NA
Fennimore, WI	105	100	0	Yes	ONP,OCC,HP,MP,A,F,G,P,WG	None	RC,NF	PR	0
King County, WA	49,000	NA	NA	No	None	None	None	PR,T,WR	<5
La Crescent, MN	205	0	10	No	None	None	NF,RS,RC (j)	PR	1
Lafayette, LA	7,654	0	25	No	None	NF	NF	None (k)	1
Lincoln, NE	7,574	0	350	No	None	None	None	PR,T	2
Lincoln Park, NJ	195	195	--	Yes	ONP,OCC,HP,A,G	None	None	None	NA
Mecklenburg Co, NC	17,303	7	10	No	None	NF	NF	PR, T	1
Monroe, WI	437	0	NA	No (j)	None	None	NF,RC	None	2
Naperville, IL	3,113	0	NA	No	None	None	NF	None	5+
Newark, NJ	4,642	70	NA	Yes	ONP,OCC,HP,A,F,G	None	RC,NF	None	88+
Perkasie, PA	76	15	--	No	None	None	NF,RC	None	NA
Peterborough, NH	267	0	15	No	None	None	None	None	1
Philadelphia, PA	26,579	NA (m)	NA	Yes	OCC,HP,A,L	None	NA	PR,T,WR	76
Portland, OR	NA	NA	NA	No	None	None	RS,RF	PR	NA
Providence, RI	1,066	0	NA	Yes	ONP,OCC,HP,A,F,G,P (n)	RF	FN	PR	10+
San Francisco, CA	62,135	0	NA	No	None	GR	RS,RC	T	33
Seattle, WA	30,000	0	NA	No	None	TX	RC, RF	T	NA
Sonoma County, CA	15,000	0	NA	No	None	RS,RF	RC	PR	NA
Takoma Park, MD	245	0	NA	No	None	None	None	None	NA
Upper Township, NJ	261	222	38	Yes	ONP,OCC,HP,MP,A,F,G,P,O	RF (o)	None	PR	5
Wapakoneta, OH	456	--	--	No	None	None	NF	None	0
West Linn, OR	379	0	50	No	None	None	RF	PR,T	1
West Palm Beach, FL	2,778	30	8	No	None	None	RC (p)	PR,T	1

Key:

A = Aluminum
Bus = Businesses
F = Ferrous Cans
G = Glass
Instit. = Institutions
GR=Grant
MP = Mixed Paper
IPC = Intermediate Processing Center
O = Oil
NA = Not Available
P = Plastic
OCC = Old Corrugated Cardboard
RS = Revenue Sharing
PR = Printed materials such as brochures
S = Scrap Metal
CS = Curbside Collection Service
HP = High-grade Paper
L = Leaves
NF = No Tipping Fees
ONP = Newspaper
RF = Reduced Tipping Fees
TX=Tax Incentive
SS = Shared Savings or Diversion Credits (haulers receive a share of money saved through recycling)
T = Technical Assistance such as waste audits and consultations
W = White Goods
WR = Workshops and Seminars
-- = Not Applicable

Notes:

(a) Businesses/institutions served with municipal curbside/alley collection of recyclables.
(b) Businesses are required to recycle designated materials. In Portland and West Linn haulers are required to collect recyclables, but businesses are not required to participate.
(c) Community offers haulers economic incentives to collect recyclables. For example, Seattle, WA, does not charge the Occupation Tax to haulers that collect commercial recyclables.
(d) Public or private sector offers businesses economic incentives to recycle, such as no tipping fee at drop-off sites.
(e) Community offers businesses technical assistance to recycle, such as waste audits, consultations, workshops, and printed material.
(f) Businesses must chose one of the listed materials for recycling.
(g) Eco-Cyle serves about 150 businesses; the number of businesses the other two haulers serve is unknown.
(h) In 1991 the City held recycling seminars for businesses and began to develop written recycling material.
(i) Most businesses deliver recyclables to the drop-off site.
(j) In 1990 businesses did not receive revenue.
(k)In 1991 the Chamber of Commerce distributed literature on source reduction in the workplace.
(l) Commercial recycling became mandatory as of 1990. Tonnage data used for this study are for 1989.
(m) The Department of Sanitation collects refuse and recyclables from small businesses. It does not know how many.
(n) These are materials mandated for recycling in 1990. This list has subsequently been revised to include wood waste, used lubricating oil, vehicle batteries, telephone directories, leaves and yard waste (after 1/193).
(o) Cape May County offers reduced tipping fees to haulers from Upper Township.
(p) Businesses were not charged a collection fee for recyclables during the pilot study.

30 communities studied, and Table 6.2 describes these communities' cornmercial/institutional waste recovery programs. Chart 6.2 shows the importance of commercial/institutional waste recovery in reaching high MSW recovery rates. Communities that achieved MSW recovery rates greater than 30 percent, recovered between 25 and 70 percent of their commercial waste streams.

How Communities Increase Commercial/Institutional Recovery Levels

The number and type of commercial recycling opportunities vary greatly among the communities studied. As Tables 6.1 and 6.2 and Charts 6.3 and 6.4 indicate, some communities, such as Lincoln

Communities Employ Multiple Strategies to Encourage Commercial Sector Recycling

Lincoln Park and **Newark, New Jersey** and **Seattle, Washington** have achieved high commercial/industrial recovery rates using a variety of the techniques described in this chapter.

Seattle successfully recovered an estimated 40 percent of its commercial and institutional waste in 1990. Without commercial/institutional waste recovery activities, Seattle's MSW recovery rate would have been 18 percent rather than 40 percent. Two private franchised haulers collect all commercial refuse in the City. Both offer their customers curbside collection of source-separated recyclables at rates 25 to 40 percent lower than those for refuse collection. A number of other for-profit and nonprofit recycling companies also collect recyclables from a large number of commercial establishments. To encourage recycling collection, Seattle exempts recycling revenues from the City Business and Occupation Tax that haulers pay on garbage collection revenues. Haulers are able to pass on these savings, as well as the savings from avoided tipping fees, to their customers.

Hundreds of private drop-off and buy-back centers throughout Seattle, as well as the two public drop-off sites operated by the Solid Waste Utility, accept commercial recyclables free of charge. The Solid Waste Utility has published the Commercial Waste Audit Manual to aid businesses in evaluating their waste streams and their current recycling programs, and to help them develop waste reduction and recycling programs.

Lincoln Park requires commercial establishments to recycle glass, aluminum, high-grade paper, newspaper, and corrugated cardboard. It encourages businesses to use the public recycling depot by allowing them to deliver materials there free of charge. Most of the Borough's 195 businesses and institutions utilize the drop-off site, and thus avoid the $118.80 per ton refuse tipping fee. Larger businesses contract with private haulers to collect recyclables or sell materials directly to market. In 1990 Lincoln Park recovered 70 percent of all waste generated by the commercial and institutional sector,

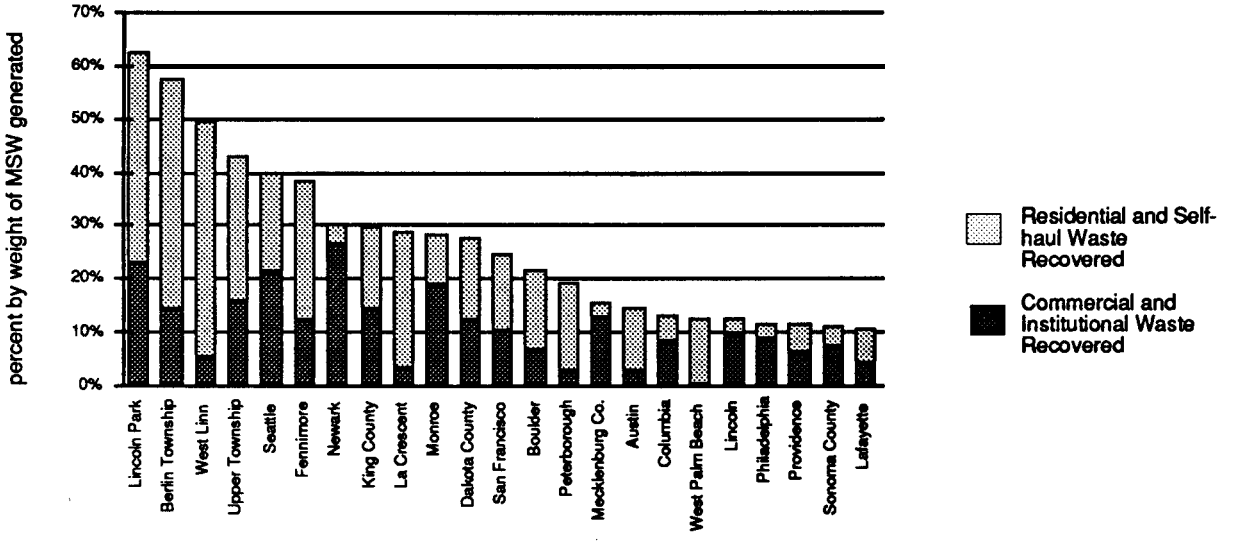
In 1989 **Newark** recovered 46 percent of its private sector waste (which consists primarily of material generated by commercial and institutional establishments), equivalent to 86 percent of the total waste recovered that year. The City requires businesses to recycle newspaper, corrugated cardboard, glass food and beverage containers, and aluminum and bimetal cans. The City will issue $25 fines to businesses that do not comply with the mandate. While private haulers collect corrugated cardboard and other recyclables from high-volume generators, Newark offers collection of corrugated cardboard to smaller businesses (for whom contracting with a private hauler may be prohibitively expensive). In addition, over 50 drop-off centers and scrap yards accept or purchase commercially generated recyclables. Since refuse tipping fees range from $97 to $102 per ton, businesses can easily realize economic benefits through recycling. To further encourage recycling, the City offers recycling workshops for businesses, notifies businesses of local marketing opportunities, and recognizes exemplary businesses at an annual awards ceremony.

Park, Newark, and Seattle, are successfully encouraging businesses to recycle, while many others are not. (See side bar, "Communities Employ Multiple Strategies to Encourage Commercial Sector Recycling.") In many instances, expanded commercial and institutional recycling efforts have been hampered by a lack of knowledge about the components of the commercial waste stream that are recyclable and compostable; few incentives for businesses to arrange separate collection for recyclable materials; and a lack of private sector recycling collection services. The following State and local government initiatives have been used to spur the development of private sector recycling programs in these and other communities:

- instituting economic incentives targeted at businesses and private haulers, such as high tipping fees at refuse disposal sites, reduced or no tipping fees at recycling drop-off sites and materials processing centers, recycling start-up funds, and rebates and tax relief for haulers who recycle commercial wastes;
- targeting a wide range of materials for recovery;
- mandating that businesses and institutions recover a wide range of recyclable and compostable materials (or prohibiting disposal of specific materials such as yard waste);
- requiring businesses to write and, submit recycling plans;
- providing technical assistance, such as waste audits and listings of drop-off sites and private recycling services;
- assisting businesses and haulers with marketing of recovered materials by informing them of different marketing options, allowing them to bring materials to public processing

Chart 6.2

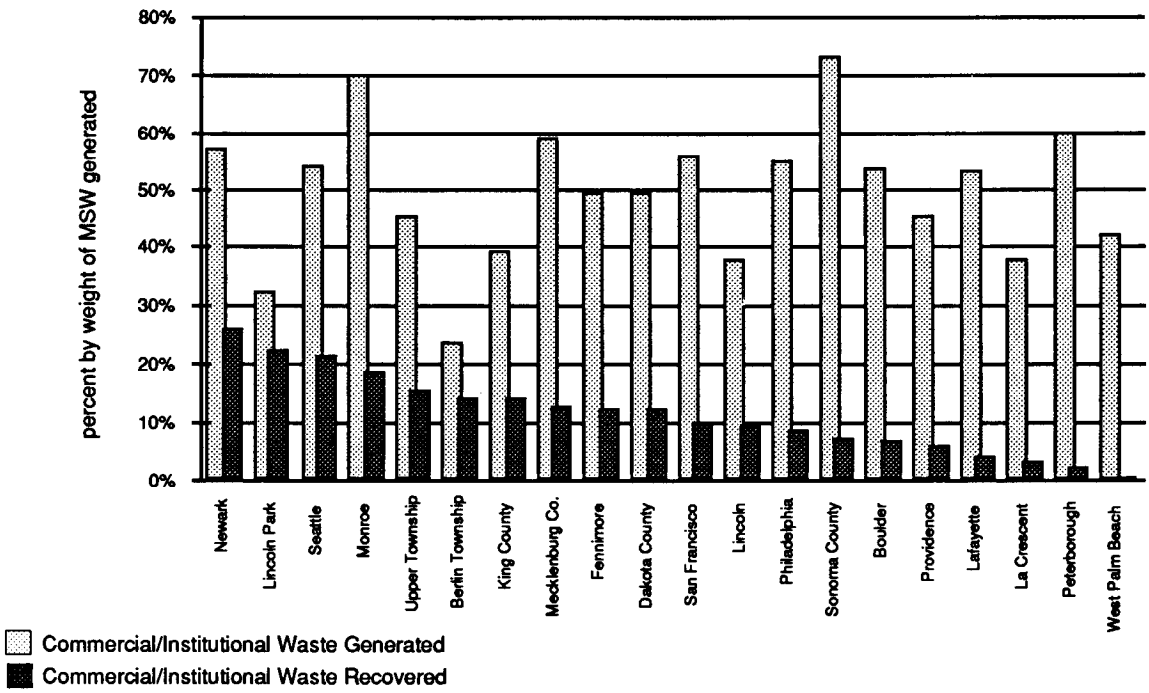
The Contribution of Commercial and Institutional Waste Recovered to MSW Recovery



Notes: A breakdown for residential and commercial materials recovered were not available in Berkeley, Bowdoinham, Portland, and Wapakoneta. Naperville, Perkasie, and Takoma Park were excluded as only residential waste recovery data was available in 1990. Self-haul waste in Austin and San Francisco includes materials generated by the residential and commercial sectors; a breakdown is not available, and these materials are included under residential materials. Commercial/Institutional waste recovered from self-haul sites in King County and Seattle is included in commercial waste recovered. Commercial/institutional recovery figures for Upper Township, Newark, Columbia, and Austin area percent of total solid waste (including C&D) as MSW figures are not available. In Upper Township and Newark commercial tonnages represent privately-collected waste only (see Appendix C for information on what this waste includes).

Chart 6.3

The Contribution of the Commercial/Institutional Sector to Waste Generated and Recovered



centers, and sharing lows if materials revenues fall below a designated threshold; and

- providing municipal pick-up of commercial/institutional recyclables and/or convenient drop off depots that accept materials generated by the commercial and institutional sector.

Economic Incentives

Economic incentives, such as high refuse disposal costs, reduced tipping fees for delivering recyclable and compostable materials to drop-off sites, rebates, revenue from the sale of recyclable, and tax incentives, encourage businesses to recycle and haulers to offer collection of recyclable materials.

Avoided Costs and Cost Savings

In cities with moderate to high tipping fees, recycling can be extremely cost-effective for businesses. Recycling reduces the size of refuse containers businesses may need and/or the frequency of refuse collection, thereby saving businesses money in disposal costs. Alerting businesses to the potential cost savings is one way communities are assisting commercial recycling efforts. Some communities with lower tipping fees are making the economic climate for recycling more favorable by further reducing tipping fees for the delivery of source-separated recyclable and compostable materials. (See Table 6.3 for a list of tipping fees.)

West Palm Beach recovered less than 1 percent of its commercial waste during the base year April 1990 to March 1991. In 1990 refuse tipping fees increased drastically to $84 per ton from $47 per ton in 1989. To alert businesses to the potential cost savings through recycling, and to encourage sustained recycling efforts in the commercial sector, the Palm Beach County Solid Waste Authority (SWA) implemented a l-year pilot bar and restaurant recycling program in 1990. At the end

of the pilot study, the SWA provided each participating business a cost analysis showing how it could reduce refuse disposal fees through recycling. By recycling corrugated cardboard and glass, some businesses were able to reduce waste volume 24 percent, and switch from an 8-cubic-yard trash dumpster costing $1,088 per month to a 6-cubic-yard dumpster that cost $816 per month. Taking into account the costs of renting three 95-gallon containers for glass at $17 each per month, and one 8-cubic-yard dumpster for cardboard at $55 per month, these businesses have been able to save $165 per month, or $1,980 per year.

Many communities now realize that commercial and institutional recycling and composting efforts play an important role in meeting high waste recovery goals.

Private haulers in Providence, Rhode Island pay a $49 per ton tipping fee at the State's central landfill for commercial refuse. Businesses in the State are required to recycle. Two-thirds of Rhode Island's large businesses that have completed mandatory recycling reports have either saved money or maintained their previous costs as a result of recycling. Businesses have reported net savings of up to $108,000 per year, while net costs reported for recycling programs ranged from $200 to $5,175 per year. Many of these costs include one-time implementation expenses. The grocery store chain "Stop and Shop," which reported the $108,000 cost savings, reduced its waste stream by 41 percent through corrugated cardboard and office paper recovery. The Brown & Sharpe Manufacturing Company, which manufactures precision metrology products, recovers high-grade paper, newspapers, magazines, wood waste, polystyrene peanuts, and coolant. During the first year of program implementation, the company diverted almost 53 percent by weight of its waste from landfill disposal and reduced its disposal costs 51 percent from $66,000 to $33,820.[2]

A number of communities, including Lincoln Park and Cape May County, New Jersey (in which Upper Township is located), and Bowdoinham, Maine allow private haulers and/or businesses to drop off source-separated recyclable and compostable materials at waste handling sites free

Table 6.3
Tipping Fees for Commercial Refuse

Community	%. Com/Inst Materials Recovered (By Wt.) (a)	Commercial Tipping Fee ($/ton)
Lincoln, NE	25%	$8
Columbia, MO	13%	$10
Boulder, CO	12%	$11
Monroe, WI	27%	$15
Sonoma County, CA	10%	$17
Lafayette, LA	8%	$20
Mecklenburg Co., NC	22%	$26
San Francisco, CA	18%	$45
Fennimore, WI	25%	Free/$32.00 (b)
Seattle, WA	40%	$31.50 to $62 (c)
King County, WA	36%	$47
La Crescent, MN	9%	$48
Providence, RI	13%	$49
Dakota County, MN	24%	$55
Berlin Township, NJ	61%	$65
Philadelphia, PA	16%(d)	$70
West Palm Beach, FL	0%	$84 (e)
Peterborough, NH	4%	$85
Upper Township, NJ (a)(b)	34% (d)	$89
Newark, NJ	46% (d)	$109
Lincoln Park, NJ	70%	$119

Notes:

(a) Percentage of commercial/institutional waste generated.
(b) From January to March 1990, refuse was tipped for free at the City-owned landfill, after March waste was incinerated for $32/ton.
(c) Seattle's 1990 tipping fee at the landfill was $32/ton; haulers paid $62/ton at City transfer stations, and $58/ton at private transfer stations.
(d) Figures are based on the tonnage handled by the private sector, which may include some residential waste. The commercial/institutional recovery activities by the public sector are not reflected in these figures.
(e) West Palm Beach's tipping fee increased from $47/ton in 1989 to $89/ton in 1991.

of charge. Mecklenburg County, North Carolina encourages businesses to recycle at the County landfill by allowing private haulers to dispose of refuse free of charge provided they separate out at least one-half of their loads for recycling. Private haulers can also avoid the $26 per ton tipping fee at County disposal sites by dropping off recyclables at publicly run drop-off sites. Such measures have proven very successful. In 1990 Lincoln Park recovered 70 percent of its commercial waste; Upper Township recovered 34 percent of its privately collected waste; and Bowdoinham recovered 54 percent of its MSW. (Commercial figures for Bowdoinham are unavailable.) Mecklenburg County recovered only 22 percent of its commercial waste in 1990; however, commercial waste comprised 81 percent of all waste recovered in the County that year.

While businesses may be able to save money in the long run through waste reduction and recycling practices, savings are not always realized immediately. This is particularly the case when a business contracts separately for refuse and recycling collection, and refuse contracts have established, nonvariable rates. In Boulder, Colorado, for example, many refuse accounts are based on 3-year contracts; cost savings cannot be achieved until the contract is renegotiated. At that time, a business can reduce the size of its refuse container or the frequency of collection.

Shared Savings and Rebates

Some refuse haulers pass on a portion of the savings from avoided tipping fees, and of the revenues earned from material sales, to those of their customers that recycle. This provides businesses an immediate incentive to recycle. Modern Clean-up Services of La Crescent, Minnesota will pay businesses for corrugated cardboard when its price reaches a certain level. In 1990 the hauler collected 52 tons of cardboard from 10 businesses. Although none of the businesses received revenues from the sale of the cardboard in 1990 or 1991, the hauler provided cardboard dumpsters free of charge and charged businesses only $5 per month for weekly cardboard collection. Modem Clean-up Services' tipping and hauling fees for refuse typically range between $53 and $60 per ton.

The City of San Francisco provided local haulers Golden Gate Disposal and Sunset Scavenger a matching grant to initiate a bar and restaurant recycling program. In 1990 approximately 300 bars, restaurants, and hotels separated glass bottles and aluminum cans in a variety of containers (including 60- and 90-gallon plastic wheeled bins, and l-cubic-yard and 1.5-cubic-yard metal containers) loaned by Golden Gate at no charge. Haulers collect these materials up to four times per week. Until September 1991, high-volume generators received rebates from their hauling fees for separating glass from refuse. The rebate ($36.50 per ton in mid-1990) proved a very effective recycling incentive. In 1990 the two haulers collected an estimated 3,500 tons of glass and cans and paid over $100,000 in rebates to bars and restaurants.[3] The haulers discontinued the rebates in September 1991 due to a decline in the market price for glass containers. The rebate may be reinstated when market conditions improve.

Shared savings and material rebates offered by private haulers are highly variable and directly depend on the tipping fees and materials revenues in that region of the country.

Tax Incentives

Communities are providing tax incentives to haulers to collect commercial recyclables, and to businesses to purchase recycling equipment. Seattle, for example, charges garbage haulers a tax on collection revenues, but excludes the collection of commercial recyclables from this tax. The City's two primary refuse haulers offer recycling services to all customers. Fees for the collection of source-separated corrugated cardboard, office paper, computer paper, magazines, aluminum and ferrous cans, and plastic and glass containers are 25 to 45 percent less than the fees for refuse collection. The haulers pass on this savings, plus the savings from avoided tipping fees, to their customers.

Targeting a Wide Range of Materials for Recovery

While there is great similarity in the composition of the residential waste stream from residence to residence, the commercial waste stream

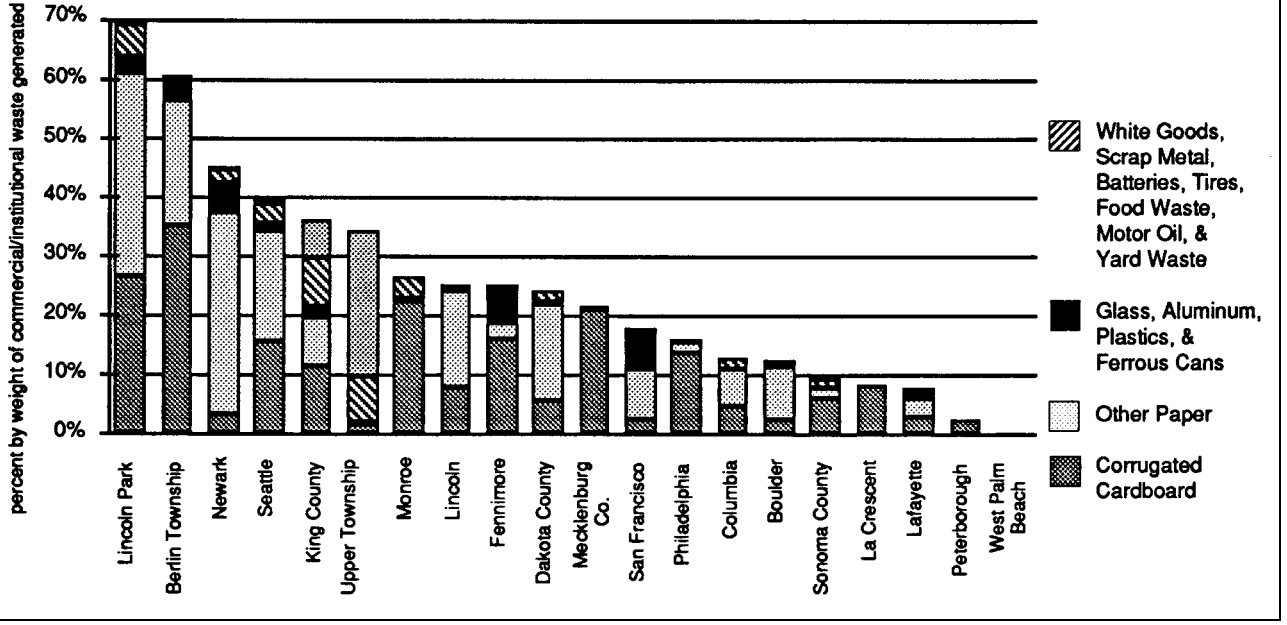
can vary significantly with the type of business. Yet within a single business establishment, the waste stream is often homogeneous. Office waste is composed mostly of paper; restaurant waste contains a large percentage of food scraps; and shopping malls generate large volumes of corrugated cardboard. In order for communities to reach high commercial recovery rates, businesses need to identify the recoverable components of their waste streams and find markets for these materials. As described in this chapter, legislative mandates, technical assistance, and planning requirements are spurring businesses to identify and recover recyclable and compostable materials. (See Tables 6.4 and 6.5 for a listing of publicly and privately collected commercial/institutional materials, and Table 5.6 for a listing of materials recovered from public and private drop-off sites.)

Paper is the largest single component of most communities' commercial and institutional waste streams, and is generally the largest component recovered (see Chart 6.4). Cities with high commercial/institutional recovery levels typically have strong paper recovery programs. Lincoln Park recycled 61 percent of its commercial waste stream in 1990 through paper recycling alone. The Borough not only required commercial recycling of high-grade paper, newspaper, and corrugated cardboard, but also accepted mixed paper at its drop-off site. Seattle, which recovered an estimated 40 percent of its commercial waste in 1990, has a successful paper recovery program. Approximately 68 percent, or 266,600 tons, of Seattle's commercial/institutional waste stream consists of paper. Of this amount, the City recovered an estimated 136,554 tons (51 percent) in 1990. In contrast, neither San Francisco nor Dakota County, Minnesota is recovering as large a volume of commercial waste paper; consequently, these communities have lower overall commercial recovery levels. Paper comprised 49 percent of San Francisco's commercial waste[4] and 57 percent of Dakota County's commercial waste, in 1990. Yet San Francisco recovered 23 percent, and Dakota County 39 percent (25,147 of an estimated 64,885 tons),[5] of commercial waste paper generated.

In 1990 Mecklenburg County recovered 22 percent of its commercial waste stream; nearly all of this material consisted of corrugated cardboard, collected by the private sector. The County hopes

Chart 6.4

Commercial/Institutional Materials Recovered



to substantially increase its commercial recovery rate by targeting other paper types in 1993, when a new processing facility, designed to process primarily waste paper from the commercial/institutional sector, will come on line. (Businesses will be charged a tipping fee to drop off materials at this facility.)

Communities are elevating commercial recovery levels by encouraging businesses to recover a wide range of materials, including glass, aluminum, ferrous metal, and food scraps. For example, 45 percent of the commercial materials recovered in King County in 1990 consisted of glass, plastics, metals, tires, motor oil, batteries, textiles, yard and wood waste, and food waste. (See side bar, "Commercial Food Waste Recovery Programs.")

Mandating Participation in the Commercial/Institutional Sector

By mandating businesses and institutions to recycle, communities encourage the establishment of a private sector recycling infrastructure.

Six of the 30 communities in our sample require businesses to recycle **a** designated list of materials. These include many of the communities with the highest commercial/institutional recovery rates, such as Lincoln Park (with a 70 percent commercial/institutional recovery rate), Newark (with a 46 percent private sector recovery rate), and Upper Township (with a 34 percent private sector recovery rate).[6]

Essex County, in which Newark is located, has mandated that municipalities provide, at a minimum, drop-off sites for corrugated cardboard and high-grade paper. In addition to these materials, Newark requires businesses to recycle newspaper, glass food and beverage containers, and aluminum and bimetal cans.

Monroe, Wisconsin has required businesses to recycle a wide range of materials (including newspaper, corrugated cardboard, glass containers, aluminum and ferrous cans and scrap, lead-acid batteries, tires, motor oil, and grass clippings) since July 1990. The City's two primary refuse haulers offer their refuse customers curbside/alley collection of recyclable materials. One of the haulers conducts waste audits for its commercial businesses before initiating recycling collection. Because refuse fees are based on per-container charges, some businesses save money through recycling.

According to State law, haulers in West Linn and Portland, Oregon are required to pick up recyclable materials from businesses, and may not charge businesses more for refuse and recycling collection than they charge for refuse collection alone. (Many haulers in Portland, however, have not informed their customers of this option.)

Comprehensive Prison Recovery Program

Spurred by rapidly escalating labor costs, the New York Department of Corrections (DOC) currently recycles several materials at 64 of its 68 facilities and composts food waste at 32 facilities. As a result of all waste recovery activities, the DOC is saving a total of $55,000 to $75,000 per month in avoided tipping and hauling fees.

Inmates ("recycling porters") source-separate recyclable corrugated cardboard, high-grade paper, newspaper, ferrous cans, plastic containers, and polystyrene. Food waste is collected daily from the kitchens and delivered to a compost pad. The food is mixed with wood chips and leaves, using a front-end loader, and formed into windrows. Operators monitor windrow temperatures and turn the windrows as needed.

At two facilities, Shawangunk and Wyoming, with 547 and 1,389 inmates respectively, corrugated cardboard, office paper, newspaper, bimetal cans, and plastic are recycled, and food waste is composted. In 1991 Shawangunk recovered 30 percent of its waste through recycling and 11 percent through composting, yielding a total recovery rate of 41 percent. Wyoming recovered 20 percent through recycling and 18.5 percent through composting.

Source: "Integrated Recycling Pays off at Prison Facilities," *BioCycle,* May 1991; and Jim Marion (Resource Management Director, Fallsburg, NY) personal communication, February 1992.

Enforcing Recycling Mandates

Many communities have established enforcement measures to ensure program participation. Enforcement measures for mandatory programs include warnings, penalties, fines, and refusal to collect refuse containing recyclables. The manager at Monroe County's landfill, for instance, periodically inspects refuse. If recyclables are found, the manager photographs the material and reports the offense to the Department of Public Works, which advises the offender how to comply with the recycling regulations. As of fall 1991, three businesses had been found to be in noncompliance with Monroe's recycling regulations, which went into effect in July 1990.

Newark may issue fines of $25 for noncompliance with commercial recycling requirements. However, no enforcement fines had been levied as of mid-1991.

In large cities, it may not always be practical for public works officials to examine refuse for compliance with recycling regulations. City officials use other mechanisms such as requiring each business to fill out a recycling planning report detailing the operation of its recovery program.

Planning and Reporting Requirements

Through waste audits and planning efforts, communities are setting in motion and tracking commercial recycling.

While businesses in Providence are responsible for arranging their own collection and recovery programs, the State provides technical assistance and tracks waste generation and recovery through mandated waste reduction and recycling plans. Businesses with more than 50 employees must submit annual recycling reports and waste reduction plans to the State according to a specific timetable. In 1990 each of these businesses was required to complete a waste audit and submit a plan to the State Department of Environmental

Table 6.4
Materials Collected from Commercial/Institutional Establishments at Curbside/Alley by the Public Sector

	ONP	OCC	HP	MP	ALUM	FR CAN	SM	GLASS	PET	HDPE	WG	OIL	BATT	TIRES	Total Materials Collected
Berkeley, CA	V	V	V	V	V	V		V							7
Berlin Township, NJ	M	M			M	M	M	M	M	M					8
Fennimore, WI	M	M	M	M	M	M		M	M	M					9
Newark, NJ		M													1
Perkasie, PA	V	V		V	V			V							5
Upper Township, NJ	M	M	M	M	M	M	V	V	V	V	V	V	V	V	14
Wapakoneta, OH		V													1
West Palm Beach, FL		V						V	V	V					4

Key:

ALUM = Aluminum
BATT = Batteries
FR CAN = Ferrous Cans
HDPE = High-density Polyethylene
HP = High-grade Paper
MP = Mixed Paper
OCC = Corrugated Cardboard
ONP = Newspaper
PET = Polyethylene Terephthalate
SM = Scrap metal
WG = White Goods

V = Set-out of material by business or institutional establishment is voluntary.
M = Set-out of material by business or institutional establishment is mandatory.

Notes:

Communities listed represent only those cities offering municipal curbside collection of commercial materials. Total materials collected may be underestimated in some cases as mixed paper can include several grades of paper. The City of Redman, located in King County, Washington, collects high-volume, low-value material such as mixed waste paper.

Management detailing the amount of material currently disposed, the amount and type of material currently recycled, a waste composition breakdown, and a proposed plan for reducing and/or recycling each component comprising over 5 percent of the waste stream, including how materials would be separated, collected, and transported to market.[7] Once recycling plans have been approved by the DEM, businesses must file annual reports on their recycling activities. As of 1991, all businesses with over 100 employees that were required to submit recycling plans to the DEM, had done so. While the DEM did not enforce implementation of such plans until mid-1991, it believes that the majority of large businesses are currently recycling. (By 1991 neither the State nor the City of Providence had determined how much commercial waste was being recycled in Providence; tonnages utilized for this study were estimated and may under-represent actual recovery levels.)

Berlin Township, with a commercial/institutional recovery rate of 61 percent, reviews all business recycling plans prior to issuing or renewing a mercantile license.

Technical Assistance

Municipalities also encourage commercial recycling through technical assistance. Eleven of the communities studied, primarily the larger communities and the counties, provide the commercial/institutional sector with some form of technical assistance. Such assistance may include:

- on-site assistance, including waste audits;
- business-specific informational exchanges and round-table discussions; and
- listings of markets, haulers, and other commercial sector publications.

While Lincoln, Nebraska recovered only 3 percent of its residential waste in 1990, it recovered 25 percent of it commercial/institutional materials. (Seventy-seven percent of the MSW recovered in Lincoln in 1990 consisted of commercially generated materials.) The City Recycling Office and the University of Nebraska Civil Engineering Department have helped encourage such recovery efforts through a waste assessment project. Ten different types of businesses, including a hospital, an office building, and a manufacturer, participated in this voluntary program. An assessment team conducted a waste audit for each business and followed with **a** technical and economic feasibility analysis for reducing each business's waste stream. Participating businesses estimate that 30 to 65 percent by weight of their waste stream has been diverted as a result of recycling.

The Philadelphia Recycling Office (PRO) has published a pamphlet, entitled *Commercial Recycling Quick Reference* to assist businesses in locating recycling vendors. Another PRO publication, *Recycling at Work: Profiles of Commercial Recycling,* highlights innovative business recycling programs, and offers instructions on how to conduct waste audits and start up a recycling program. PRO has also organized a number of business-specific information exchanges to promote recycling.

Awards

Prestigious awards can spur businesses and institutions to recycle. Awards provide businesses with free advertising and can be a valuable public relations tool. A number of cities including Newark and Lincoln, where businesses pay refuse tipping fees ranging from $8 to $102 per ton, distribute awards annually to businesses.

Assisting Businesses and Haulers with Marketing Recyclable

Some municipalities are helping local haulers and businesses locate markets for commercial recyclable, and in some cases, accepting privately generated material at public facilities. Mecklenburg County, for example, plans to open a recycling facility to process commercially generated waste paper. The County will charge businesses a tipping fee to drop off this material.

Private haulers in Providence have reported some difficulty marketing commercially generated recyclables. The State of Rhode Island allows private haulers to use the State processing facility as a market of last resort, however, it charges the private sector a tipping fee equivalent to the tipping fee at the State landfill.

Table 6.5
Materials Privately Collected at Curbside/Alley from Commercial/Institutional Establishments

	Year Data Collected	ONP	OCC	HP	MP	ALUM	FR CAN	SM	GLASS	PET	HDPE	OTHR PLAS	WG	OIL	FOOD	BATT	TIRES	TEX	Total Materials Collected
Austin, TX	FY89	V	V	V	V	V	V		V										7
Berkeley, CA (a)	FY91																		NA
Berlin Township, NJ	1990		M	M	M														3
Boulder, CO	1990	V	V	V		V			V										5
Bowdoinham, ME	FY90	V	V	V	V	V	V	V	V	V	V	V						V	12
Columbia, MO	FY90	V	V	V		V			V	V									6
Dakota Co., MN (b)	1990	V	V	V	V	V	V		V	V	V	V							10
Fennimore, WI	1990																		0
King Co., WA	1990		V	V	V	V	V	V											6
La Crescent, MN	1990		V																1
Lafayette, LA	FY90	V	V	V	V	V	V		V	V	V								9
Lincoln, NE	1990			V	V	V													3
Lincoln Park, NJ	1990	M	M	M		M			M										5
Mecklenburg Co.,NC	1990		V																1
Monroe, WI	1989		V																1
Naperville, IL (c)	1990	V	V	V		V	V		V	V	V	V							9
Newark, NJ	1989	M	M	M	V	M	M	V	M					V	V	V	V		12
Perkasie, PA	1990																		0
Peterborough, NH	1990		V																1
Philadelphia, PA	FY90		M	M	V	M	V			V	V				V		V		9
Portland, OR	1990	V	V	V	V		V	V	V	V	V								9
Providence, RI	1990	M	M	M		M	M	V	M	M	M	V	V	V	V	V		V	15
San Francisco, CA	1990	V	V			V			V										4
Seattle, WA	1990		V	V	V	V	V		V	V	V	V							9
Sonoma Co., CA	1990	V	V	V		V			V										5
Takoma Park, MD	1990																		0
Upper Township, NJ	1990	M	M	M	M	M	M		M	M	M			M	V				11
Wapakoneta, OH	9/89-8/90																		0
West Linn, OR	1990	V	V		V		V		V	V	V			V					8
West Palm Beach, FL (d)	4/90-3/91		V																1

Key:

ALUM = Aluminum
BATT = Batteries
FR CAN = Ferrous Cans
HDPE = High-density Polyethylene
HP = High-grade Paper
MP = Mixed Paper
OCC = Corrugated Cardboard
ONP = Newspaper
OTHR PLAS = Other Plastics
PET = Polyethylene Terephthalate
SM = Scrap metal
TEX = Textiles
WG = White Goods

V = Set-out of material by business or institutional establishments is voluntary.
M = Set-out of material by business or institutional establishment is mandatory.
NA= Not Available

Notes:

The number of total materials collected may be underestimated in some cases as "mixed paper" and "other plastics" can include several types.

(a) Private haulers offer curbside collection of certain recyclables to their refuse customers. Specific information is not available.
(b) All plastics with a neck are accepted.
(c) Other plastic is polystyrene, 6-pack rings and clear polystyrene.
(d) Corrugated cardboard was collected during the last 3 months of the year documented.

A cooperative program in New Hampshire, run by the Governor's office, the State Food Waste Recycling Association, the University of New Hampshire, and the State Veterinarian's Office, helps local food producers locate food waste users, such as pig farmers.[8]

Municipal Collection

In some communities, private haulers do not offer businesses collection of recyclables. In such cases, and in order to reach high recovery rates, some municipalities become the primary hauler of commercial recyclables. Municipalities either provide businesses collection services, contract with private haulers to provide such service, or establish drop-off sites that accept recyclables generated by commercial and institutional establishments.

In Berlin Township businesses are required to recycle. The Department of Public Works collects refuse from 20 of the 280 businesses located in the Township but offers recycling service to 200. It collects source-separated aluminum and tin cans, glass, corrugated cardboard, HDPE and PET plastic containers, newspaper, and scrap metal on a weekly basis, for no charge from these 200 businesses. Upon request, the Township provides bars and restaurants with 20- and 55-gallon drums for glass storage, and with 20-gallon drums for storage of aluminum, tin cans, and plastic containers. In 1990 Berlin Township recovered 61 percent of its commercial/institutional waste stream.

The City of Wapakoneta, Ohio collects commercial and institutional refuse; since 1990 it has also collected corrugated cardboard for recycling. The City is restructuring its refuse fees to provide businesses maximum incentive to source-separate cardboard. It will charge businesses $10, $12, or $14 per pick-up of mixed

Commercial Food Waste Recovery Programs

For more than 10,000 years, people have kept swine and fed them food wastes. This practice continues today in many communities. In New Jersey, food scraps from 12 food waste classes are fed to swine. These include bakery waste, seafood residues, and residential food scraps, as well as waste from restaurants, institutions, dairies, processing plants, supermarkets, and camps. In Philadelphia, hog farmers collect an untracked amount of food waste from bakeries, hospitals, prisons, and supermarkets for use as a feed.

Due to geographical and other factors, recovering food waste for animal feed is not always feasible. Animal rendering operations are another means of food waste recovery. Renderers collect meat scraps from butchers and supermarkets for the manufacture of soap, cosmetics, perfume, and animal feed. Standard Tallow, a company located in Newark, provides customers with barrels for food scraps, which it collects up to two times per week. Approximately 2 percent by weight of the materials collected through commercial (and other private sector) recovery efforts in 1989 consisted of food scraps.

The large amount of food waste generated in institutions such as prisons and schools can also be composted. Brown University in Providence, Rhode Island recovers food waste from dining halls. The hog farmer picks up the food waste (estimated at 1,500 pounds a day) every morning, 7 days a week. Beginning in 1989 with a pilot project at two facilities, the New York Department of Corrections (DOC) currently composts a good portion of the food waste produced at 32 of its 68 facilities. (See side bar, "Comprehensive Prison Recovery Program.")

Businesses can donate unused food to shelters. City Harvest in New York City delivers 10,000 pounds of food that restaurants, corporations, and cafeterias would otherwise dispose of, to homeless shelters, day care centers, and other social service facilities.

Source: Jeffrey Suhr et al., *Feasibility of Food Waste Recycling in New Jersey*—Fourth Quarterly Draft Report to the New Jersey Office of Recycling, Rutgers University, New Brunswick, NJ, 1984; and *Inform Reports*, Inform, Inc., New York City, Summer/Fall 1991.

Hospital Recycling and Source Reduction Initiatives

Large institutions, such as hospitals, generate significant amounts of solid waste. In some communities, hospitals are beginning to target their waste for recycling and to substitute reusable products for disposable ones. For example, twenty of the twenty-three hospitals in the Seattle metropolitan area are now using cloth diapers. Emerson Hospital in Boston reported savings of approximately $1,000 annually by using a cloth diaper service.

In Philadelphia, the Hospital of the University of Pennsylvania established a recycling program in 1988. Thirty-five departments, including the nursery, pharmacy, and many laboratories, collect corrugated cardboard, high-grade paper, clear glass, and aluminum cans for recycling under the supervision of an area coordinator. Collection of corrugated cardboard alone has decreased the volume of waste disposed by an estimated 20 percent, saving the hospital an estimated $25,000 to $30,000 per year. The hospital plans to add polystyrene and PET and HDPE plastics to the program in July 1992. The recycling program has not required hiring any additional staff.

Hospitals in Monroe, Wisconsin are required by City law to recycle a range of materials, including glass, many grades of paper, and ferrous and aluminum cans. In order to meet these requirements, St. Clare Hospital purchased a baler to bale corrugated cardboard on the premises. Hospital departments separate newsprint, high-grade paper, mixed paper (including magazines), glass, metal, four types of plastic, and batteries. Materials are placed in separate bins in a "recycling room" located near the loading dock. Hospital personnel then haul these recyclables to the City recycling center. In summer 1991, the hospital intends to switch from disposable to cloth diapers, and from paper to cloth drapes in surgery rooms.

The Butterworth Hospital in Grand Rapids, Michigan conducted waste audits in all its departments to identify opportunities for reducing and recycling the waste stream. The hospital switched from disposable to autoclavable bed pans, saving an estimated $15,000 per year in product expenditures and $877 in disposal fees. Butterworth has also been recycling corrugated cardboard for over 10 years, and most of its departments collect mixed office paper for recycling. An estimated 70 tons of corrugated cardboard and 40 tons of mixed paper are recycled per year at this 529-bed facility.

Sources: Prall Culviner, "Disposable Diapers - Do They Have a Future?" *Waste Age*, May 1991; Charles DiPietro Robbe, "Michigan hospital creates 'Recyclicare' program," *BioCycle*, May 1991.

refuse, depending on container size, but only $8 per pick-up of segregated cardboard.

Businesses in Berkeley receive municipal refuse collection service. Refuse rates are based on container size as well as on frequency of collection service. Businesses may receive municipal curbside/alley collection of recyclables for no additional fee. (The City's cost for the separate collection of recyclables is covered by the refuse fees it charges businesses.) In 1990 the City collected recyclable materials from 250 businesses. By 1992, 600 businesses had signed up for recycling collection service.

Sometimes private haulers charge moderate fees for collection of recyclables from large-volume generators, but relatively high collection fees for smaller generators. In some cases, municipalities provide collection service to smaller businesses. In Newark, for example, private haulers collect most commercial wastes, but the City provides smaller businesses with free collection of corrugated cardboard in all major business corridors. This service costs the City $58 per ton. Newark has expanded the number of corrugated cardboard customers from 70 in 1989 to 247 in 1991.

In some communities, private haulers will not pick up high-volume, low-value recyclable materials. Communities can encourage private haulers to offer collection of such materials. For example, in Redmond, Washington (located in King County), the City contracts with a private recycler on a per ton basis to pick up mixed paper and other low-grade paper from small and

large businesses. The fee paid to this hauler is obtained from a waste surcharge that the City has levied on all businesses. All businesses are, in effect, paying for this service.

Many businesses, particularly smaller ones, utilize drop-off and buy-back sites for recyclables. Cities can encourage commercial recycling efforts by allowing businesses to drop off materials at publicly run or contracted drop-off sites. Lincoln Park, for example, encourages businesses to use the public drop-off site, The Borough spends an average of $54 per ton of material collected and processed through the drop off site. Businesses primarily deliver corrugated cardboard, which the Borough was able to sell for $12 to $15 per ton in 1990.

The Community Conservation Centers Inc. (CCC), a nonprofit company in Berkeley, operates two drop-offs and one buy-back site. Businesses can deliver newspaper, mixed paper, glass containers, aluminum and tin cans, refillable wine bottles, and corrugated cardboard to all three sites. They are paid for materials brought to the Berkeley Buy-Back Center, which is operated under contract with the City. For the $25,000 the City paid CCC to operate the buy-back in FY 1991, it recovered a total of 2,386 tons of material (from both the commercial and the residential sectors) at a cost to the City of approximately $10 per ton.

Recycling in a Resort Community

Upper Township, a resort community in Cape May County, New Jersey, requires commercial and residential recycling. To assist commercial recycling efforts, the Township collects recyclable materials from 222 of its 260 businesses. The County has provided real estate agents with recycling bins for motels and rental apartments, and with stickers in each unit instructing vacationers how to recycle. Upper Township supplies marinas, campgrounds, bars, and restaurants with 20-gallon containers for commercial recyclables. The program has been so successful that in the summer of 1990 the Township had to hire an additional crew to collect materials twice a week. In 1990 Upper Township recovered 43 percent of its total solid waste.

Conclusion

Cities are stimulating businesses and institutions to recover a wide range of recyclable materials. Commercial and institutional waste recovery helps communities meet high recycling goals. Communities, particularly large cities, can encourage commercial recycling through legislative mandates, technical assistance, and recycling planning requirements, and by allowing private haulers to deliver materials to public processing centers. Communities that collect refuse from the commercial and institutional sector may find it cost-effective to collect source-separated recyclable and compostable materials from this sector as well. Communities with such incentives and programs in place are already recovering 40 to 70 percent of their commercial and institutional waste streams and continue to strive for still higher recovery levels.

Notes

[1]The large percentage of commercial waste generated in certain rural communities is attributed to the relatively low per capita generation of residential waste. Due to backyard composting waste burning and other factors, per capita residential waste generation is quite low in many rural communities, ranging between 1 to 2 pounds per person per day in many instances.

[2]John McCabe, "Commercial waste recycling: the experience in one state," *Resource Recycling,* November 1991.

[3]Although the haulers would like to continue the service, Golden Gate's Recycling Manager estimates that 30 percent by weight of the commingled material was lost to theft in the beginning of 1990. In addition, the Company incurred several thousand dollars in damages to toters and bins due to scavenging of materials. The Recycling Manager attributes these problems to the increase in California's redemption value from 1.5 to 2.5 cents in January 1990. Customers have since been asked to secure bins to prevent further scavenging. An estimated 15 percent of customers no longer receive the service due to their inability to secure containers. The haulers have also enlisted the help of the local police to enforce the City's anti-scavenging ordinance. As of mid-1990, seven arrests had been made.

[4]This estimate was calculated by the Institute for Local Self-Reliance based on data from Brown, Vence, and Associates. This consulting company estimates that San Francisco generated 191,375 tons of waste paper in 1990. A total of 392,764 tons of commercial waste were generated that same year, minus animal manure and inerts. (Brown, Vence and Associates, personal communication, November 1991.)

[5]The tonnage of commercial waste paper generated was obtained from Franklin Associates, Ltd., *Dakota County Generation and Characterization Study,*February 1991.

[6]New Jersey businesses are required by State law to recycle.

[7]In June 1992 the provisions of the mandated recycling plan were altered and streamlined.

[8]*Resource Recycling,* November 1991,22.